

3.1.3 Flood

3.1.3.1 Affected Environment

Surrounding Area

Topography

The topography of Soledad Canyon directly east of the site is rugged and sparsely vegetated. About ½ mile east of the site, Agua Dulce Creek drains into the Santa Clara River as the creek flows from the north through Agua Dulce Canyon. Northwest of the site, Bee Canyon drains in a southwesterly direction to its confluence with the Santa Clara River. To the south, Bear Creek flows in a northwesterly direction through the rugged Bear Canyon watershed into the Santa Clara River. The mountain range south of the Project site and south of the Santa Clara River extends westerly for approximately another 3 miles to Sand Canyon.

The gradient along the low-flow channel of the Santa Clara River from Acton Camp past the site ranges from about 92 to 72 feet of drop per mile (GWSI 1993). West of the site and west of Soledad Canyon, the Santa Clara River Valley broadens out gradually, and the river gradient flattens to about 53 feet of drop per mile.

Hydrology

Climate

Soledad Canyon and most of the surrounding area are semiarid. Most precipitation occurs between November through April. Annual average rainfall ranges from about 8 to 23 inches within the watershed of the Project. Average rainfall near the site is estimated to be 14 to 15 inches per year. South of the site, elevations increase to about 4,800 feet, and rainfall increases to about 22 inches per year (GWSI 1993). Seasonal precipitation data as shown in Table 3.1.2-1 varies from water year to water year and by precipitation station. For example, Soledad Canyon (Station 405B) shows a low of 5.20 inches (water year 1960-61) to a high of 36.28 inches (water year 1982-83).

Surface Water

Surface water discharge from the Acton Basin occurs as the Santa Clara River flows through Soledad Canyon. Surface flows have historically been measured at two gaging stations located immediately southwest of the Project site. Each gaging station was in operation during a different period of time, and they are herein referred to as the Old Lang Gaging Station and the New Lang Gaging Station. The Old Lang Gaging Station was located at a railroad bridge west of a railroad tunnel and south of the Project site, and the New Lang Gaging Station is located approximately 1,800 feet downstream from the Old Lang Gaging Station. The locations of these stations are shown on Figure 3.1.3-1.

Records for the Old Lang Gaging Station are complete for the period from October 1949 through September 1968. During that period, the records indicate that there was a constant surface flow that varied substantially in size. Beginning in April 1970, flows were recorded at the New Lang Gaging Station. Flow measurements were taken here until September 1989 and did not indicate a constant surface flow at that point on the river. Both stations are currently inoperative.

At any point along the reach of river in the Project vicinity, total river flow consists of either a subsurface underflow through permeable alluvium or a combination of subsurface underflow and surface flow. Geophysical investigations indicate that the river channel cross-sectional area of permeable alluvium at the Old Lang Gaging Station is relatively narrow and shallow when compared to that at the New Lang Gaging Station. Because the subsurface cross-section area of the Old Station is smaller than that of the New Station, less subsurface water can pass by the Old Station than the New Station. As a result of this condition, more surface water flow would be measured at the Old Station than the New Station during a given time period. In some cases, during low-flow periods, surface flow could have been measured at the Old Station, while none would have occurred at the New Station. The records of flows for the two stations are not exactly comparable (GWSI 1993).

The highest monthly flow recorded at the Old Lang Gaging Station was 9,630 acre-feet during January 1952. The highest monthly flow recorded at the New Lang Gaging Station was 16,984 acre-feet during March 1983.

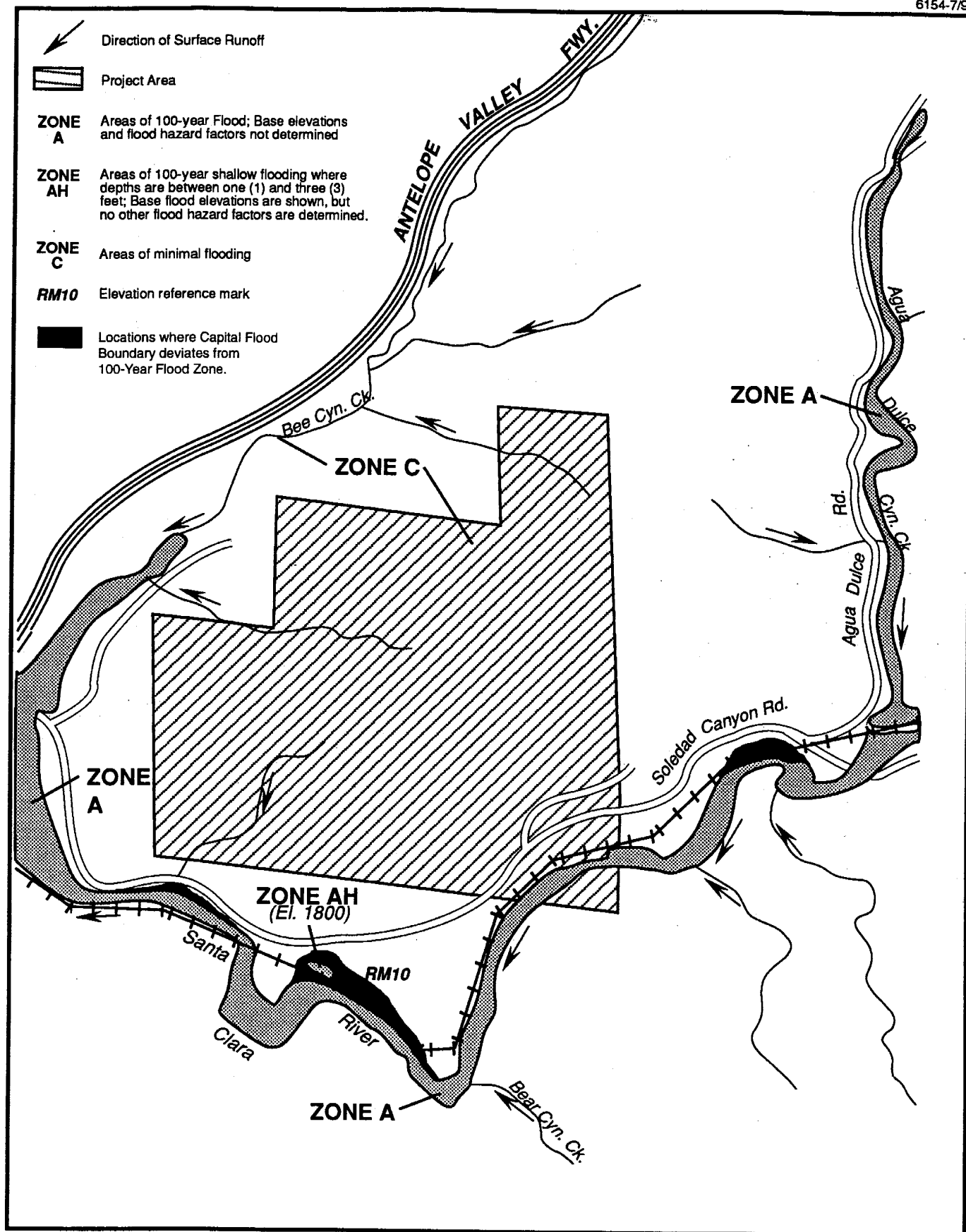
Floodplain

Executive Order 11888, Floodplain Management, as amended May 24, 1977, and its implementing guidelines (40 CFR 6030) directs all federal agencies to avoid, if possible, development and other activities in the 100-year base floodplain. Where the base floodplain cannot be avoided, special considerations and studies for new facilities and structures are needed. Design and siting are to be based on scientific, engineering, and architectural studies; consideration of human life, natural processes, and cultural resources; and the planned life-span of the project.

Federal agencies are required to:

- ▶ reduce the risk of flood loss;
- ▶ minimize the impact of floods on human safety, health, and welfare; and
- ▶ restore and preserve the natural and beneficial values served by floodplains in carrying out agency responsibility.

The 100-year floodplain near the Project site is shown on Figure 3.1.3-2. Floodplain designations are established by the Federal Emergency Management Agency (FEMA) Federal Insurance Administration. Zone A represents areas of probable 100-year floods. Zone AH represents an area of 100-year shallow flooding where depths of water are between 1 and 3 feet. Zone C represents areas of minimal flooding, the depths of which are not delineated.



Source: Federal Emergency Management Agency (FEMA)
Flood Insurance Rate Map No. 065043-0370B, 1980

FLOOD HAZARD AND DRAINAGE MAP
Figure 3.1.3-2

The purpose of the National Flood Insurance Program designations is to encourage state and local governments to wisely use the lands under their jurisdictions by considering the hazard of flood when rendering decisions on the future use of such land, thus minimizing damage caused by flooding. The DPW has adopted these designations as part of its regional plan.

Project Site

Topography

The majority of the site north of Soledad Canyon Road is rugged and sparsely vegetated, ranging in elevation from about 2,000 feet at Soledad Canyon Road to 2,740 feet along the ridge. This property is shown as Areas A and B on Figure 1.2-2. Agua Dulce Peak, just east of the site, is the highest point on the ridge at an elevation of 2,843 feet. The ridge orientation trends southwest-northeast, roughly bisecting the site. Surface mining by previous operators has taken place on about 45 acres located in the southeast corner of the site, north of Soledad Canyon Road. This disturbed area has steeply cut unvegetated slopes with steep unpaved access roads. The site area delineated as Area B is downslope of Area A. Soledad Canyon Road, the Southern Pacific Railroad, and the Santa Clara River all traverse Area B roughly from the northeast to the southwest. Soledad Canyon Road and the railroad act as barriers to natural drainage but have stormwater drainage culverts constructed beneath them to provide for drainage of flood flows. The area between Soledad Canyon Road and the railroad contains siltation ponds from previous mining operations and a private access road.

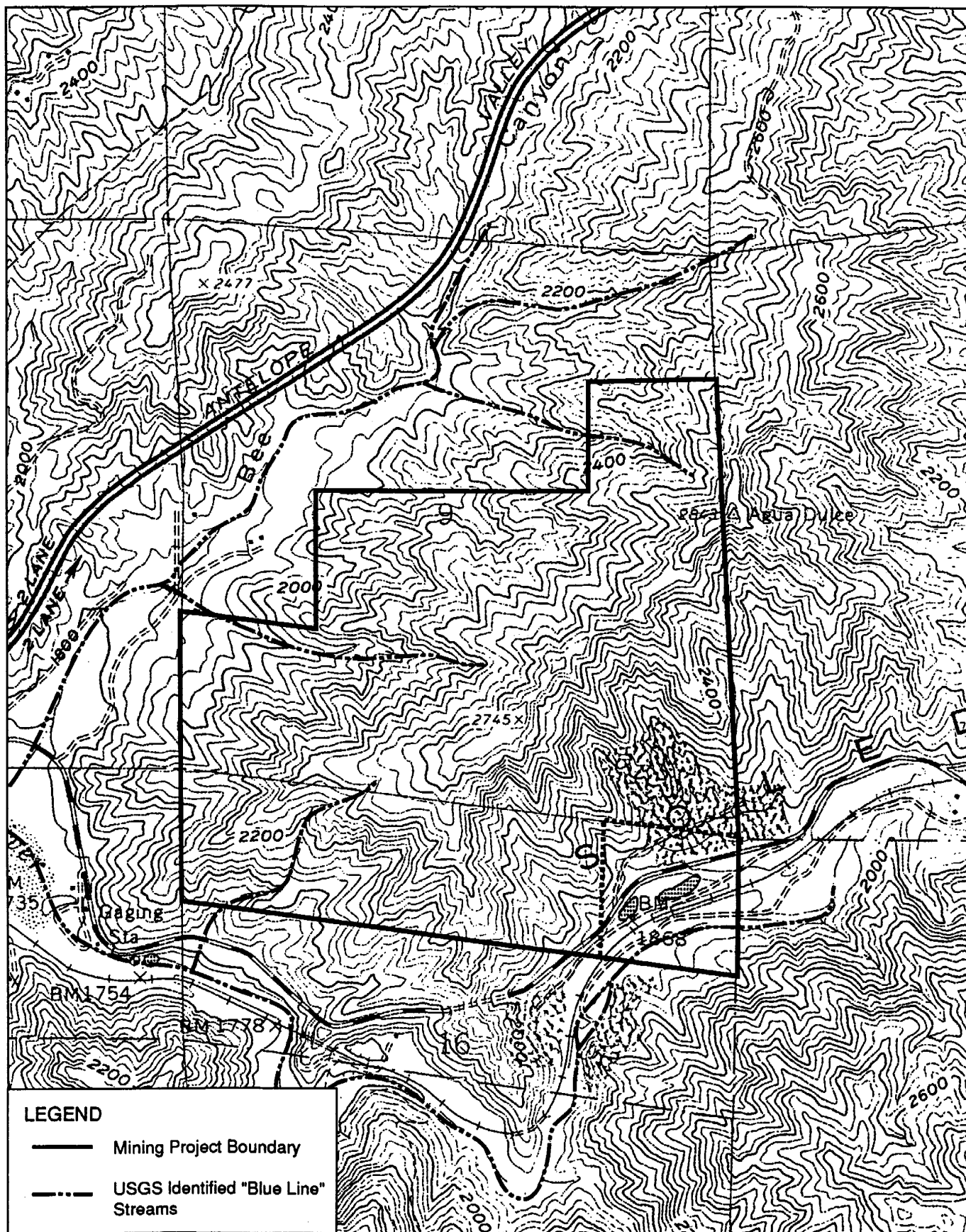
Hydrology

The site is semiarid, as described for the surrounding area. Generally, the period from November through April accounts for 92 percent of the yearly precipitation. Rainfall in the site vicinity, averaged over 47 years, is 14.33 inches per year as measured from Soledad Canyon Station No. 405B. This station is located about 3.5 miles east of Bear Creek and the Project site; therefore, the data more directly relate to potential runoff from the site.

The entire site drains to the Santa Clara River. About 65 percent of the site runoff drains directly southeast, off the steep southerly slopes into the river. The rest of the runoff drains into Bee Canyon, which in turn drains into the Santa Clara River west of the site.

Three ephemeral streams are indicated on the site as "blue line streams" per the USGS Agua Dulce topographic map, 7.5-minute series. These blue line streams are shown on Figure 3.1.3-3. Two of these streams flow westerly off the northern portion of the site into Bee Canyon, and the other stream flows southwesterly off the western portion of the site directly into the Santa Clara River.

Currently, stormwater runoff from the disturbed mining area is uncontrolled. Due to the lack of properly maintained desilting/debris basins, silt and debris regularly inundate a Soledad Canyon Road culvert near the existing site entrance. Work crews from the DPW must regularly excavate silt and debris to prevent overtopping and flooding of Soledad Canyon Road.



**"BLUE LINE" STREAMS ON AND
ADJACENT TO THE PROJECT SITE**
Figure 3.1.3-3

Floodplain

The Santa Clara River at the project site drains a watershed of about 157 square miles upstream. The river crosses the southeast corner of Area B, which is the only portion of the site in the 100-year floodplain. The Santa Clara River, throughout its course through Area B, is designated as Zone A per FEMA (Figure 3.1.3-2).

3.1.3.2 Environmental Effects

Significance Criteria

An impact will be considered significant if:

- ▶ improvements such as mining, grading, constructing barriers and structures, and impervious surfacing increase and/or divert rainfall runoff and/or affect its collection and conveyance in such a manner as to cause inundation, sedimentation, and/or damage from water forces to the subject Project and/or other properties;
- ▶ increased inundation and/or groundwater recharge resulting from the Project increases the likelihood of ground liquefaction should an earthquake occur; and/or
- ▶ increased inundation and/or groundwater level changes resulting from the Project cause an increase in soil settlement, or ground swelling, that damages structures, utilities, or public works.

An impact will be considered beneficial if it improves upon the criteria mentioned above (i.e., reduces flood risk, increases groundwater recharge) without causing a secondary impact (i.e., an increase in potential for liquefaction).

Direct and Indirect Effects

Potentially significant adverse flood-related impacts from the Project are possible primarily because of effects related to grading and mining activities. Removal of existing vegetation and exposure of disturbed soils to stormwater runoff can significantly increase the rate of runoff and increase the quantity of flood flows (Q) by increasing the amount of sediment carried by the flood waters. Mining activity will also change the size of watershed drainage areas, increasing flood flows in locations with larger drainage areas and decreasing flood flows in locations with smaller drainage areas. In order to avoid significant adverse impacts, drainage plans have been developed by TMC that will control stormwater runoff, erosion, and sedimentation.

Drainage Concept

Drainage plans were prepared for TMC by Environmental Solutions Inc. (ESI) and the C.A. Rasmussen Company. C.A. Rasmussen is the landowner of Area B of the Project site. ESI developed preliminary design concepts and erosion control criteria. C.A. Rasmussen

augmented, modified, and refined ESI's preliminary work. The final plans exist as a drainage concept designed by C.A. Rasmussen (1993) and erosion control designs for onsite facilities created by ESI, which are reflected in the revised Project plan sheets of the Application for Surface Mining Permit.

The drainage concept characterizes existing drainage conditions at the site. Furthermore, it establishes requirements for drainage facilities for the Project, both during Project operations and for postproject conditions. The drainage concept analyzes the hydrology and hydraulics of the facilities that currently exist, as well as the proposed facilities that will exist during and after Project operations.

Watersheds were delineated for each area of the 460-acre property where mining activity would take place. Drainage conditions were analyzed for six different conditions that characterize the status of the Project throughout its life. Those conditions include preexisting conditions, conditions during each of four separate mining cuts, and postproject conditions. The stormwater runoff flowpath was analyzed for each situation. Design criteria for flood control works were based on the worst-case scenarios expected to occur at any time during or after operation of the Project.

The stormwater runoff from each tributary drainage area will be channeled into one of seven basins. These desilting/debris basins will trap the sediments and debris that occur in the onsite flood flows and will also trap sediment and debris from all storm events (including capital storms) and discharge clearer water to offsite areas. The basins will retain all of the stormwater from lesser storms for controlled later release.

As the final mining cut (Cut 4) proceeds, the existing ridgeline will be cut back to the north, which will increase the size of the tributary drainage areas on the south side of the ridge due to the increased surface area exposed from mining. The increased size of the tributary drainage areas will result in somewhat increased flood flows on the south side of the ridge and decreased flood flows on the north side of the ridge.

The quantitative characterization of site hydrology is based on the methodology established by the DPW. Drainage facility requirements were based on the 50-year capital flood and were in accordance with the guidelines of the County Hydrology/Sedimentation Manual (1991).

Desilting/debris basins will be located as shown on Figure 3.1.3-4. The basin sizes were determined based on an analysis of soil types, likely debris production, impervious factors (e.g., paved areas), and time of concentration (the time it takes for rain falling on the most remote part of the tributary area to flow to the basin located in the lowest part of the area). Each of the debris basins will have a berm height of less than 25 feet and a storage capacity of less than 50 acre-feet. Thus they will not fall under the jurisdiction of the Department of Water Resources, Department of Safety of Dams.

Tributary drainage areas were calculated for each phase of mining. Likewise, debris production was calculated for each drainage area for each phase of the mining project. The stormwater runoff rate, calculated in cubic feet per second (cfs), was estimated for each basin under each



Age group	Number of people
0-14	480
15-24	450
25-34	420
35-44	380
45-54	350
55-64	320
65-74	280
75-84	250
85-94	220
95-104	100

Source: West Coast Environmental, 1993

BASINS AND DRAINAGE AREAS OF THE PROJECT SITE

condition, assuming that the site vegetation had been burned (a worst-case scenario that speeds runoff) and considering the likely debris production from each area. The summary of this analysis is presented in Table 3.1.3-1. The required debris capacity and flow rate for basin outlet pipes are listed in Table 3.1.3-2. The resultant flow to each existing culvert for each condition is listed in Table 3.1.3-3. Culvert locations are shown on Figure 3.1.3-5.

The analysis shows that the existing 30-inch-diameter culvert, under Soledad Canyon Road near the southeast corner of the property, is adequate for all scenarios or mining phases, except for the currently existing condition. Installation of the proposed desilting/debris basins will improve existing conditions and render the culvert adequate (see Mitigation Measure F1). Another existing 36-inch-diameter culvert in the area is not adequate for any scenario and must be supplemented by a parallel 45-inch-diameter culvert if adverse impacts are to be avoided. TMC proposes to add a 45-inch-diameter reinforced concrete pipe culvert to provide adequate culvert discharge capacity. The new culvert will be installed when other road improvements are made during the initial stages of the Project (see Mitigation Measure F2).

Procedures for temporary control of site drainage during construction phases have been incorporated into Project design and include grading benches and roads so that water flows in controlled paths against the face of cut slopes and placing sandbag berms at periodic intervals to slow the flow of water. Desilting/debris basins will be constructed as soon as possible when surface disturbance is to occur in a tributary drainage area.

Onsite drainage facilities to be incorporated are detailed on the project design plans. These design features include V-ditches, onsite culverts, drop inlets, drainage pipes, and desilting/debris basins. C.A. Rasmussen made one substantial revision to ESI's plans by combining desilting/debris Basin 2 and Basin E into a new basin designated Basin 2E (Figure 3.1.3-4).

Drainage from the NFSA will be controlled during fines placement by desilting/debris basins (as provided in Mitigation Measure F1). Each year, prior to the wet season, the disturbed areas that are to be permanently abandoned will be reseeded in a program of concurrent revegetation. Vegetation density and cover will eventually approximate preexisting conditions. The recontouring and revegetation of the fill area will establish sheet flow runoff for the postproject condition. The design of the top of the NFSA was modified to provide a smooth runoff area and avoid concentration of runoff waters.

The desilting/debris basins will be constructed during the pre-production phase. All basins will be removed and the areas reclaimed at the end of the project. Revegetation of these areas is included in the revegetation plan for the Project. Two of the desilting/debris basins (Basins B and F) will be constructed in blue line streams. Construction of the debris basins is a preproduction activity, the impacts of which are assessed as construction effects in Section 3.1.4.2.

During the life of the NFSA, desilting/debris basins will be installed to collect debris, sediment and storm water runoff. In large storm events and whenever the basin is full, water will be discharged from the basin at the rate it is received. During lesser storm events, perforated drain

Table 3.1.3-1

DESILTING/DEBRIS BASIN HYDROLOGY SUMMARY

Basin	Existing ¹	Cut ² 1	Cut 2	Cut 3	Cut 4	Post ³
Burned Discharge⁴ (Qburned cfs)						
1	- ⁵	19	26	26	26	-
2E ⁶	-	171	187	183	216	-
A	50	50	50	50	43	43
B	74	74	74	74	37	37
C	23	23	23	23	24	24
D	40	40	40	68	56	56
F	45	45	45	42	42	42
Burned and Bulked Discharge (Qburned & Bulked cfs)						
1	-	26	35	35	35	-
2E ⁶	-	227	250	243	286	-
A	68	68	68	68	59	59
B	101	101	101	101	50	50
C	31	31	31	31	32	32
D	55	55	55	93	74	44
F	61	61	61	58	58	39
Debris⁷ (cy)						
1	-	555	833	833	833	-
2E ⁶	-	6,438	6,938	6,771	8,214	-
A	-	1,887	1,887	1,887	2,164	-
B	-	2,886	2,886	2,886	1,499	-
C	-	777	777	777	777	-
D	-	1,499	1,499	2,498	2,164	-
F	-	1,942	1,942	1,443	1,443	-
Tributary Area⁸ (acres)						
1	-	10	15	15	15	-
2E ⁶	-	116	125	122	148	148
A	34	34	34	34	39	39
B	52	52	52	52	27	27
C	14	14	14	14	14	14
D	27	27	27	45	39	39
F	35	35	35	26	26	22
¹ Existing denotes project site as it exists before mining. ² Cut refers to site at conclusion of each mining phase. ³ Post denotes site as it will exist following reclamation. ⁴ Discharge refers to flow from tributary area into basin facilities. ⁵ - indicates not applicable. ⁶ Basin 2E is the basin combining Basins 2 and E. ⁷ Debris indicates volume of debris from tributary area into basin facilities. ⁸ Tributary area is the watershed above each basin. cfs = cubic feet per second cy = cubic yards						

Table 3.1.3-2

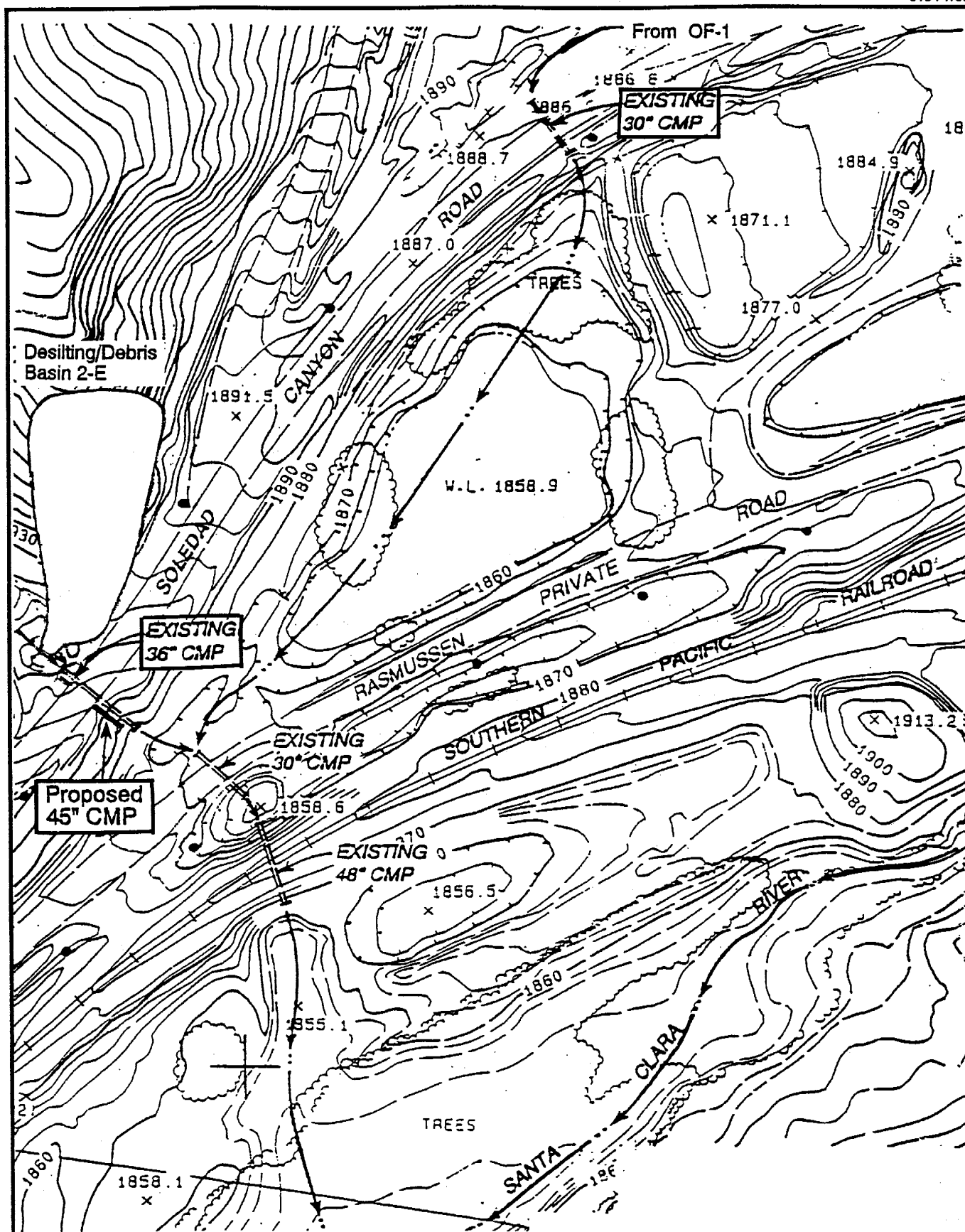
**REQUIRED DEBRIS CAPACITY
AND FLOW RATE FOR BASIN OUTLET PIPES**

Basin	Mining Cut Number(s)	Required Debris Capacity (Total Sediment Volume - cy)	Required Flow Rate* for Basin Outlet Pipe (Q _{burned} - cfs)
1	2 - 4	833	26
2E	4	8,214	216
A	4	2,164	50
B	2	2,886	74
C	1 - 4	777	24
D	3	2,498	68
F	1 - 2	1,942	45
* Basin outlet pipe capacity is the same number as "Burned Discharge (Q _{burned} cfs)" shown in Table 3.1.3-1.			

Table 3.1.3-3

CULVERT HYDROLOGY SUMMARY

Culvert (inches)	Exist	Cut 1	Cut 2	Cut 3	Cut 4	Post
Total Flow to Culvert Inlet (Q_{burned} and bulked cfs)						
30 ¹	215	57	64	64	64	52
36 ²	122	207	237	237	265	278
48 ³	358	284	319	319	346	348
Culvert Tributary Area (acres)						
30	99	28	33	33	33	24
36	57	137	146	143	169	180
48	171	181	202	199	224	220
¹ 30-inch culvert under Soledad Canyon Road east of existing access road. ² 36-inch culvert under Soledad Canyon Road west of existing access road. ³ 48-inch culvert under the railroad downstream of the 36-inch culvert.						



FEET
0 100

Source: Environmental Solutions, Inc.

**CULVERT LOCATIONS AND DRAINAGE
FLOW PATH FROM SITE TO
SANTA CLARA RIVER**
Figure 3.1.3-5

pipes will allow the basin to drain continuously at a rate equal to the contents of the entire basin over a 40-hour period. During this period, up to 80 percent of the sediment will be retained in the basins. Some sediment will be present in the basin discharge, however sediment is also present in the natural discharge. The design and utilization of the desilting/debris basins result in less than significant drainage impacts.

The NFSA will account for 100 acres (or 8 percent) of the 1,225 acre drainage area for the Bee Canyon wash. Post-TMC Project, this area will be reduced by 80 acres, resulting in a 20 acre (or 1.6 percent) decrease in the Bee Canyon drainage area. The TMC Project will increase the drainage area by a maximum of 5 acres or 0.4 percent. This change to the overall size of the drainage area is not considered to be significant.

Other Project Impacts

Downgradient culverts from the Soledad Canyon Road are not subject to negative impacts because of implementation of the Project. A culvert under the C.A. Rasmussen access road is a private culvert and, as such, is not subject to County design requirements. C.A. Rasmussen, the private landowner, is satisfied with the current and proposed conditions for that culvert. The major downstream culvert in this drainage pattern is a 48-inch-diameter culvert that runs under the Southern Pacific Rail Road. The 48-inch culvert has adequate capacity for all scenarios or phases of the Project.

No negative impacts are associated with floodwaters contacting hazardous materials because TMC will design, build, and operate the proposed facilities according to the specifications detailed in the SWPPP and the SPCCP (see Mitigation Measure F3; West Coast Environmental 1997a, 1997b).

3.1.3.3 Mitigation Measures

The following mitigation measures are incorporated as part of the Project design:

- F1. The Project will include construction of seven desilting/debris basins in accordance with specifications of the Drainage Concept Plan to control surface runoff and sedimentation. During final design, the Applicant shall submit detailed plans for the debris basins including a static and seismic slope study that analyzes all proposed debris basin slopes greater than 3:1 (H:V) gradient. Plans shall be approved by the DPW prior to the commencement of grading work on the project.
- F2. A 45-inch culvert will be installed under Soledad Canyon Road to accommodate existing runoff conditions as well as conditions for the Project. The construction of desilting/debris Basin 2E and the addition of the 45-inch-diameter culvert under Soledad Canyon Road are Project design features that result in beneficial impacts by correcting inadequate existing conditions.

- F3. Proper maintenance and cleaning of erosion control facilities and desilting/debris basins will be conducted as part of the Project operations. Inspection frequencies and maintenance procedures are required by the SWPPP (see Appendix B1). These procedures are detailed in the Storm Water Management Practices section of that plan. The following provision will be added to the SWPPP: stormwater desilting/debris basins will be inspected after every storm event and every 24 hours during prolonged storm events. Prevention of spills of hazardous materials, such as petroleum fuels and products, is addressed in the SPCCP (see Appendix B2).

Implementation of the Project plans and mitigation measures will result in beneficial rather than adverse impacts.

3.1.3.4 Unavoidable Significant Adverse Effects

The measures proposed above can be feasibly implemented and will reduce the identified impacts to a less-than-significant level. No potential significant unavoidable adverse impacts will remain after mitigation.